Glenn Research Center, Environmental Program Manual

Chapter 37 - Indoor Air Quality

NOTE: The current version of this Chapter is maintained and approved by the Environmental Management Office (EMO). The revision date for this chapter is May 2003. If you are referencing paper copies, please verify that it is the most current version before use. The current version is maintained on the Glenn Research Center intranet http://osat-ext.grc.nasa.gov/emo/pub/epm/epm-contents.pdf. Approved by: EMO Chief, Michael Blotzer {mailto: Michael.J.Blotzer@grc.nasa.gov}.

PURPOSE

The objective of the Indoor Air Quality (IAQ) Program is to provide healthful indoor environments through proper facility design, operation, and maintenance. The program also provides a mechanism for resolving concerns about IAQ.

Please note that policies regarding the safe use of and regulatory requirements for hazardous chemicals (e.g. lead, asbestos and carcinogens) are covered in other chapters of this Manual.

APPLICABILITY

This chapter is applicable to all personnel at Glenn and Plum Brook Station, including, but not limited to, civil servants, contractor personnel, and students.

BACKGROUND

Good IAQ is important to ensure a healthy and productive work environment. IAQ is affected by a variety of factors, including building design, occupancy loading, and the work being performed. IAQ issues are commonly associated with non-industrial, non-laboratory office buildings where typical office operations (use of copy machines, laser printers, and retail chemical products), building products (carpets, furniture, etc.), or smoking, combined with improperly designed, used, or maintained heating, ventilation and air conditioning (HVAC) systems may create an irritating or unhealthful environment.

The variety of work performed at NASA Glenn Research Center poses special concerns for IAQ. Few buildings are dedicated office-only space. Instead, it is common to have office space co-located in buildings with research laboratories or shop areas. IAQ is also affected by maintenance and renovation activities in Center facilities. As a result, unusual odors may indicate a loss of contaminant control in laboratory or shop operations or poorly controlled construction and maintenance activities.

Due to employee concerns over chemical hazards, complaints of unusual odors in the workplace are the most common IAQ issue at the Center. These complaints receive a high level of attention and response.

Combustion exhaust products from various facilities are another contributor to poor IAQ at the Center. Stack heights are limited at the Center due to the proximity to Cleveland Hopkins Airport so that combustion exhaust is released near to the ground and may enter air intakes of nearby buildings resulting in a strong odor of jet exhaust indoors. Exhaust from motor vehicles idling near building fresh air intakes is another source of combustion products.

POLICY

It is Glenn Research Center's policy to provide a healthful indoor environment, which complies with federal, state, and local regulations and applicable national consensus standards. This will be achieved through proper design, operation, and maintenance of building systems.

Good IAQ will also be achieved through compliance with Executive Order 13058, which prohibits the smoking of tobacco products in all interior space and in any outdoor areas in front of air intake ducts.

RESPONSIBILITIES

Industrial Hygiene Team (IHT)

- Provides guidance on the requirements of Federal, State, and Local ventilation regulations as well as standard industry guidelines.
- Provides technical guidance and support on minimizing the impact of construction, renovation, and maintenance activities on indoor air quality.
- Serves as the focal point for receiving and investigating IAQ complaints at Cleveland facilities.
- Recommends corrective actions to resolve IAQ problems.
- Provides Building Managers with information gained from investigations.
- Maintains a log of IAQ complaints.
- Utilizes approved funding for projects to correct high priority problems.

Plum Brook Management Office (PBMO)

- Serves as the focal point for receiving and investigating IAQ complaints at Plum Brook Station facilities.

Facilities and Test Engineering Division (FTED)

- Ensures building and HVAC system designs and modifications meet the requirements of ANSI/ASHRAE standards 55 (12) and 62 (13) and do not adversely affect local exhaust ventilation systems.
- Designs and implements construction and maintenance projects to minimize their impact on indoor air quality.
- Ensures that architects and engineers involved in the purchase or modification of local exhaust ventilation systems are trained in ventilation design for contaminant control.
- Maintains building systems in good working order to reduce the potential for indoor air quality problems.
- Assists the Industrial Hygiene Team (IHT) in identifying and correcting indoor air quality problems.
- Ensures that construction projects are managed and implemented in a way that will minimize impact on local building occupants (i.e. minimize dust generation, noise and chemical entrainment into buildings).

Construction Contractors

- Provide, manage, and implement construction projects that minimize impact on local building occupants. Contractors shall comply with all Occupational Safety and Health Administration (OSHA) regulations as well as with the GRC program.

Logistics and Technical Information Division

- Provides house keeping services that maintain carpets in accordance with recommendations by the Carpet and Rug Institute (25) with the exception that frequency of vacuuming may be in accordance with recommendations of the Association of Specialists in Cleaning and Restoration (7).

- Selects carpets, cushions, and adhesives labeled under the Carpet and Rug Institute IAQ testing program (4) and installs carpets in accordance with the Carpet and Rug Institute (3). (Note: carpet should not be installed under water coolers or other areas where chronic moisture promotes the growth of mold and fungi.)

- Provides pest control services in accordance with the General Services Administration publication Integrated Pest Management (IPM) for Buildings; Desk Guide for Facilities Managers.

Supervisors (Research, Laboratory, and Shop Areas)

- Ensure that Local Exhaust Ventilation (LEV) is operated in accordance with the requirements of this program.
- Stop operations, tag LEV "out of service," and contact the IHT if, for any reason, a LEV system is suspected of being deficient.
- Inform the IHT of all newly installed LEV systems and all modifications of LEV systems.

Employees (Research, Laboratory, and Shop Areas)

- Operate LEV in accordance with this Chapter and Chapter 16, Local Exhaust Ventilation.
- Conduct operations using capture or receiving hoods within the distance indicated on the annual ventilation survey sticker
- Use laboratory hoods with the sash adjusted to maintain airflow within normal operating range of 80 - 120 fpm
- Report any LEV that does not appear to adequately control employee exposure to air contaminants or has been modified in a way that may adversely affect airflow.
- Use personal protective equipment, including respirators, for materials included in the most recent hazard assessment. Notify Supervisor if other uses of respirators are required.

Supervisors (Office Areas)

- Be familiar with the Program requirements and ensure their employees comply with them.
- Support the Indoor Air Quality Program as it relates to the needs of their employees.
- Ensure that office refrigerators are maintained free of spoiled food.
- Support the IHT in identifying areas of concern.

Building Managers

- Notify the IHT when IAQ concerns are brought to their attention.
- Assist the IHT in conducting IAQ investigations by providing pertinent information on building layout, activities and providing access to areas within the building.
- Assist the IHT in distributing information to the building occupants.

Employees (Office Areas)

- Comply with all aspects of the program
- Comply with the proper procedures for conducting an Indoor Air Quality Investigation.
- Support the IHT in identifying areas of concern.
- Notify the Building Manager when using the respirator for materials other than those in the most recent hazard assessment.

REQUIREMENTS

Construction and maintenance activities in occupied buildings must be planned and managed to minimize the release of dust, vapors, fumes and other air contaminants to protect workers and building occupants.

Proper carpet maintenance, regular vacuuming using a vacuum equipped with high-efficiency filters and deep cleaning every 12 - 18 months, increases the life of a carpet and helps ensure carpets do not become a source of dust, mold, bacteria, and other indoor air contaminants. Selecting low-emission carpets, cushions, and adhesives will minimize indoor air quality problems with new carpet installations.

Integrated pest management techniques are more effective in controlling insects and rodents and also reduce indoor air quality problems created during pesticide applications.

Do not allow parked vehicles to remain running unless it is necessary to carry out a task. If vehicles must remain running, locate the vehicle so the exhaust does not become entrained into the building.

Do not obstruct supply air vents or return air grills. Blocking these units can cause the HVAC system to become unbalanced or adversely affect the ventilation of a neighboring office. Furniture, boxes or other materials stored near supply vents or return grills will affect airflow.

Do not block access panels to window fan coil units. Blocking access panels with heavy furniture prevents proper preventive maintenance such as filter changes and cleaning of the unit.

Partitions and modular furniture can obstruct airflow and lead to temperature extremes, especially in areas where window fan coil units are used. Select modular furniture that is as short as possible and allows airflow underneath.

Keep windows closed. Opening windows will adversely impact the ventilation system causing it to overcompensate in order to keep up with the temperature demands. This will lead to even greater temperature extremes in the room.. Allowing unconditioned air into the room may also increase the humidity, that in turn, can contribute to microbial growth or sinus irritation. Temperature adjustments for rooms should be accomplished by using the thermostat in the room, controlling the fan speed, and closing drapes or blinds. Opening windows also allows unfiltered air into the building. This means much of the dusts, pollen, and spores that normally get filtered will be brought into the building. These can adversely affect sensitive individuals. If you feel your HVAC system is not working properly, contact maintenance.

Comply with the smoking policy. When smoking outside, do not smoke near air intake systems or near doors where the smoke can easily become entrained into the building.

Clean up personal water spills promptly and report water leaks right away. Water creates a hospitable environment for the growth of mold and bacteria. Call maintenance to fix any water leaks and call housekeeping to have water damaged material dried immediately. Water damaged material should be thoroughly dried within 24 hours if possible.

Maintain plants properly. It is possible for microbes to grow in the soil and on the leaves of plants. Water spills can also provide an adequate environment for growing mold or bacteria. Plants should not be placed on top of window fan coil units. When leaves fall into the unit they can block the condensate drain line and cause the unit to overflow. they can also emit odors as they rot as well as provide a good environment for microbial growth. The leaves also affect the ability of the unit to perform as designed.

Dispose of garbage promptly and properly.

Store food properly. Food attracts pests and when some foods are left unrefrigerated, they can spoil and generate unpleasant odors. Never store perishable foods in desks or on shelves. Refrigerators should be cleaned on a regular basis to prevent odors. Keep kitchens and dining areas clean and sanitized to prevent pests.

Leave office doors unlocked so housekeeping can properly maintain carpets.

Notify the building manager immediately if an IAQ problem is suspected.

PROCEDURE

Indoor Air quality investigations involve the cooperation of several organizations within GRC including, the affected individuals, the Environmental Management Office, building managers, maintenance, and construction. There are four main stages of an investigation:

1. Occupants notify the building manager of indoor air quality concerns. The building manager contacts the Industrial Hygiene Team (IHT).
2. The IHT conducts occupant interviews and a building walk-through survey to gather the following information:
    - Occupant concerns and symptoms they are experiencing
    - Visual inspection of the building
    - Basic layout of the building

- General information on the ventilation system

3. The third stage of the investigation will typically consist of the collection of some of the following information depending upon the nature of the concern:
   - Review of information from old building records, maintenance, construction and test engineers
   - Field measurements of temperature, relative humidity, and carbon dioxide
   - Measurements and evaluation of the HVAC System
   - Air and bulk sample collection
   - Analysis of building materials
4. The final stage of the investigation consists of data evaluation and the issuance of recommendations for corrective action(s) usually in the form of a report.

Because many factors can affect indoor air quality and many indoor air quality-related issues could mimic other concerns (i.e. ergonomics, stress, etc.) the IHT may evaluate more than one aspect of indoor air quality (i.e. mold concentration). In some instances, when no contaminant(s) can be identified as the responsible agent for IAQ complaints, the individual(s) experiencing clinical symptoms of hypersensitivity may need to be relocated.

RECORDS

- Log of IAQ Complaints
- IAQ Reports

REFERENCES

1. IAQ Guidelines for Occupied Buildings Under Construction, Sheet Metal and Air Conditioning Contractors' National Association.
2. Commercial Carpet Maintenance Manual, Carpet and Rug Institute.
3. Standard for Installation of Commercial Carpet, CRI 104 - 1996, Carpet and Rug Institute.
4. Standard Industry Reference Guide for Installation of Residential Textile Floor Covering Materials, CRI 105 - 1995, Carpet and Rug Institute.
5. Floor Covering Maintenance for School Facilities, Carpet and Rug Institute.
6. Guidelines for Operating Bitumen Roofing Kettles, Construction Safety Association of Ontario.
7. Guide to Carpet Cleaning Methods and Selecting a Carpet Cleaner, Association of Specialists in Cleaning and Restoration, http://www.ascr.org/guide.htm.
8. Indoor Air Quality (proposed rule), Occupational Safety and Health Administration.
9. Integrated Pest Management (IPM) for Buildings: Desk Guide for Facilities Managers, General Services Administration.
10. Integrated Pest Management Program Contract Guide Specification, General Services Administration.
11. Protecting Federal Employees and the Public From Exposure to Tobacco Smoke in the Federal Workplace. Federal Register: October 20, 1997, Volume 62, Number 202, Page 54461
12. Thermal Environmental Conditions for Human Occupancy (ANSI/ASHRAE 55-1992) American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
13. Ventilation for Acceptable Indoor Air Quality (ANSI/ASHRAE 62-2001), American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Safety and Assurance Technologies Directorate (SATD)
Environmental Management Office Chief: Michael Blotzer
Chapter Lead: Betty L. Hodgson {mailto:Betty.L.Hodgson @grc.nasa.gov}
Web Curator: Sandra Jacobson {mailto:Sandra.Jacobson@grc.nasa.gov}

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